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# Computer Aided Industrial Design Software Selection in Industrial Product Design Education at Turkey Using Expert Choice Program

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## Abstract

Computer technologies have developed rapidly in the last half century and today have become one of the most useful tools for Industrial Designers. Using the power of the computer and the software is not an arbitrary choosing for Industrial Designers; instead it has been a professional requirement.

In this paper, selection of softwares taught at Computer Aided Industrial Design (CAID) courses in Industrial Product Design Undergraduate Programmes at Turkey examined through three staged surveys and obtained datas analyzed at decision making program, Expert Choice. The assessment and final results of the study points out the required qualifications of CAID education at Turkey.

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Keywords: CAID, Design Education, Decision Making

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## 1. Introduction

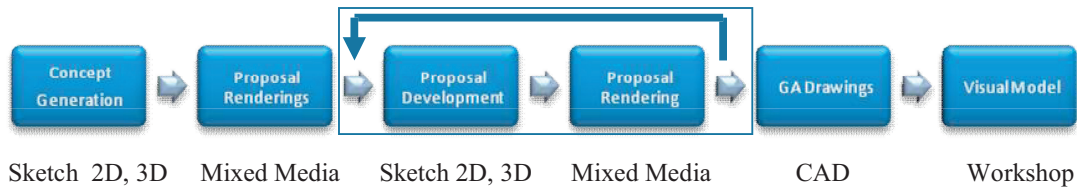
By the development of computer technology, computer aided industrial design concept and softwares supporting the concept has been created. These softwares provide support to designers at gathering knowledge, sketch, 2D design, 3D design, prototyping and visualization stages of design process. Using CAID softwares is not an arbitrary choosing for Industrial Designers; instead it has been a professional requirement. Evans (1994) indicates that, CAID method accelerates design process, sharing knowledge with other designers and process can be managed more efficiently. He compares Archers' conventional industrial product design strategy with CAID

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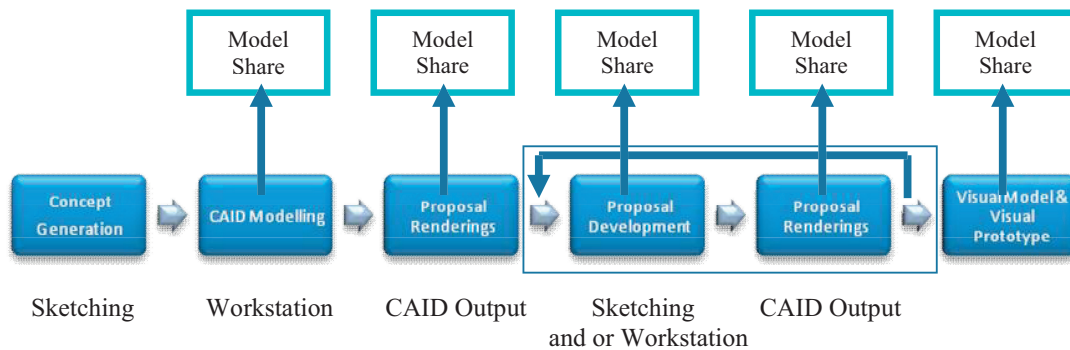
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method. In conventional method, possible design problems arise at the end of the process, whereby at CAID method possible problems can be controlled and prevented at every stages.



**Fig. 1.** 'Conventional' industrial design strategy



**Fig. 2.** Collaborative CAID methodology

Beside the effective usage at design process, CAID method has advantage on recruiting designers in industry. As a result of Süels' (2006) survey on "Effective criterias for hiring designer", the criteria of "using computer well" (%72.5) is the second most important criteria, after the criteria of "to be educated in design" (%90).

Kindı (2007) denotes at his study on 'job postings' that, postings has a very little emphasis on creativity, while most postings almost exclusively refers to the demand for computer skills.

CAID software knowledge has a positive impact on the process of recruiting, as well as advantages on design process. Thence CAID courses are given in Industrial Product Design Departments at Turkey to prepare students for Professional life; but the number and nature of the courses given varies upon university.

One of the reasons that CAID courses reveal differences in programs can be considered as diversity of universities vocational perspectives.

In this study, without regarding vocational perspectives of universities, a decision making strategy has been implemented on CAID software choices at Industrial Product Design, Undergraduate Programmes at Turkey.

## 2. Method

Selection of softwares taught at Computer Aided Industrial Design courses in Industrial Product Design Undergraduate Programmes at Turkey will be examined through three staged surveys and obtained datas will be analyzed at decision making program, Expert Choice.

## 2.1. Software Selection Criterias

Various amateur or professional CAID software exist in market. Selection of these softwares and usage at design process by designer depends on criterias. These criteria were determined as:

- Price
- Ease of Use
- Ease of Learning
- Sectoral Demand
- Modeling Method
- The aim of use

### 2.1.1. Price

Softwares, used at universities are mostly education versions and economic. Price appears as an important criteria at sector. Many companies prefer to work with cheap softwares instead of expensive ones.

### 2.1.2. Ease of Use

Ease of use criteria covers a wide range, so divided into three sub-criteria:

- Interface

Ease use of interfaces increase the efficiency. User, not experiencing barriers, establishes a harmonious relationship with the software.

- Ease of access to information

Easy access to information resources like sample model, sample scene, material, supports user to use software more effectively.

- Ease of information exchange between softwares

Programs that support the exchange of information makes the design process more effective and aid designers to create their own CAID techniques.

### 2.1.3. Ease of Learning

A software, learned without encountering obstacles, increases the user's motivation and confidence in the program.

### 2.1.4. Sectoral Demand

The usage of softwares varies upon the sector. In this study Stand Design, Interior Design, Consumer Electronics, Yacht Design and housewares industry have been researched.

### 2.1.5. Modelling Method

Different modeling methods can be used during design process. NURBS or Polygon / MESH methods are used in surface modeling, solid modeling techniques are preferred for production-oriented drawings and graphics, 2D/vectoral drawing softwares are used for visual presentation. For an effective design process, the methods can be used together.

- Surface Modelling
- Solid Modelling
- 2D/vectoral drawing

### 2.1.6. The Aim of Use

The purpose of the software usage, and effective features of softwares during design process, been used for determining the values of criteria.

- Presentation
  - Photo-Realistic Rendering
  - Technical Drawing
  - Preparing Presentation
- Design
  - 2D Drawing
  - 3D Drawing
  - Be Revised
- Production
  - Accuracy
  - Analysis
  - Dimensioning
  - Production Connectivity

## 2.2. Software Alternatives

Software preferences for use have regional reasons. For ex. softwares FormZ and Modo are widely used abroad but not recognized in Turkey. Due to the awareness and use of the softwares upon regions, study includes only Industrial Design Undergraduate Programs at Turkey. Alternative softwares choosen according to softwares frequently used at university education and companies.

Software alternatives are:

- 3dsMax
- Alias Wavefront
- Autocad
- Catia
- Cinema 4D
- CorelDraw
- FormZ
- Freehand
- Illustrator
- Maya
- Modo
- Photoshop
- ProEngineer
- Rhinoceros
- Solidworks
- Unigraphics

## 2.3. Survey Study

In order to determine the weights of the criterias, three layered survey study was done.

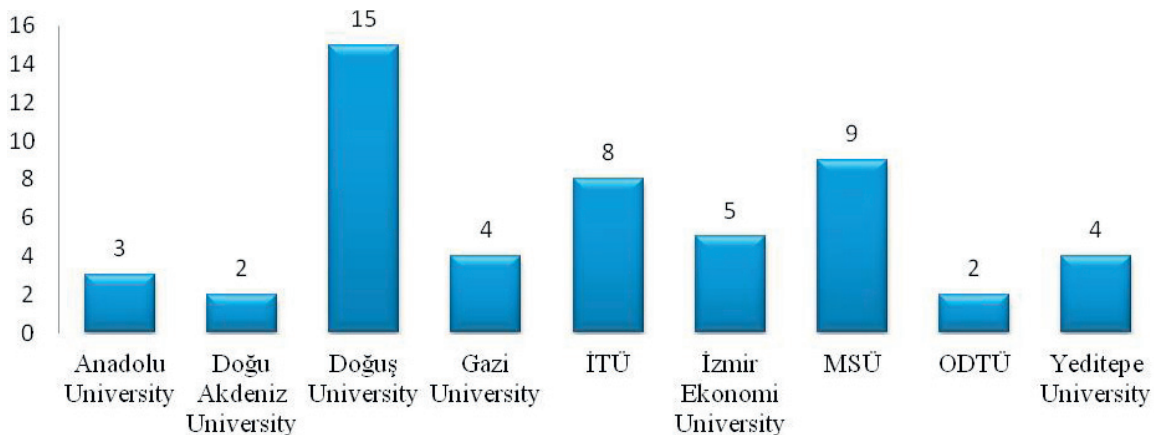
The first survey study was carried out between Industrial Product Design Department's Undergraduate Students at Turkey. Distribution of 52 students participated in survey upon university can be seen at Table 1.

The second survey was carried out with instructors of CAID courses. Instructor's selections were determined as twice of students at Expert Choice programs' decision tree. Contacted with instructors by phone or via e-mail. During this phase, realized that except 3 universities, all courses were given by part-time instructors.

Among all survey results, 5 instructors' survey results excluded from the analysis, because of part time instructors' lack of continuity, not taking place among the decision-making process at department, could affect the reliability of the survey results.

The third survey study performed by designers, working in the industry. Contacted with 3 firms from each Stand Design, Interior Design, Consumer Electronics, Yacht Design and housewares sector and the question of “Which softwares do you use at design process” was directed to them.

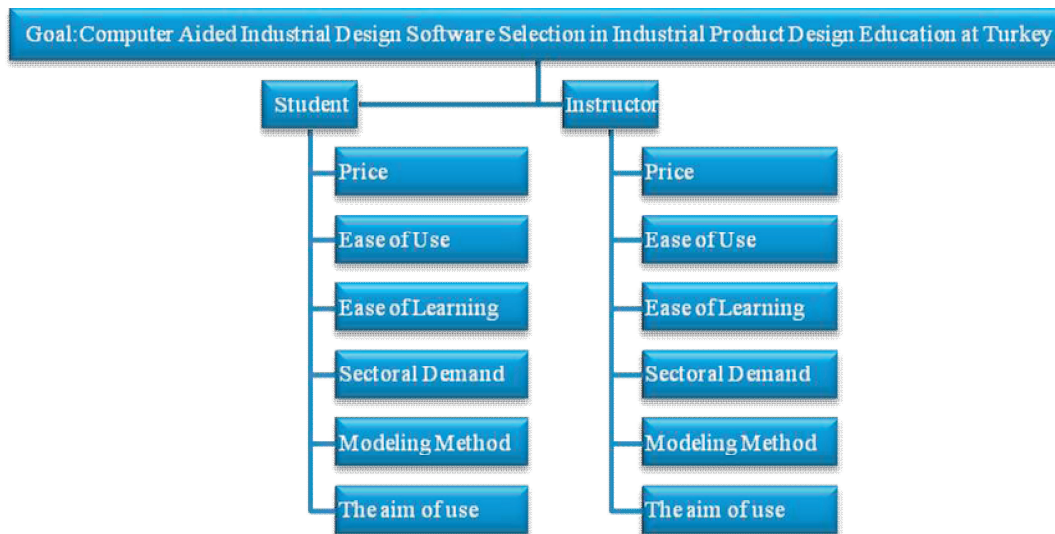
**Table 1.** Student participation to survey

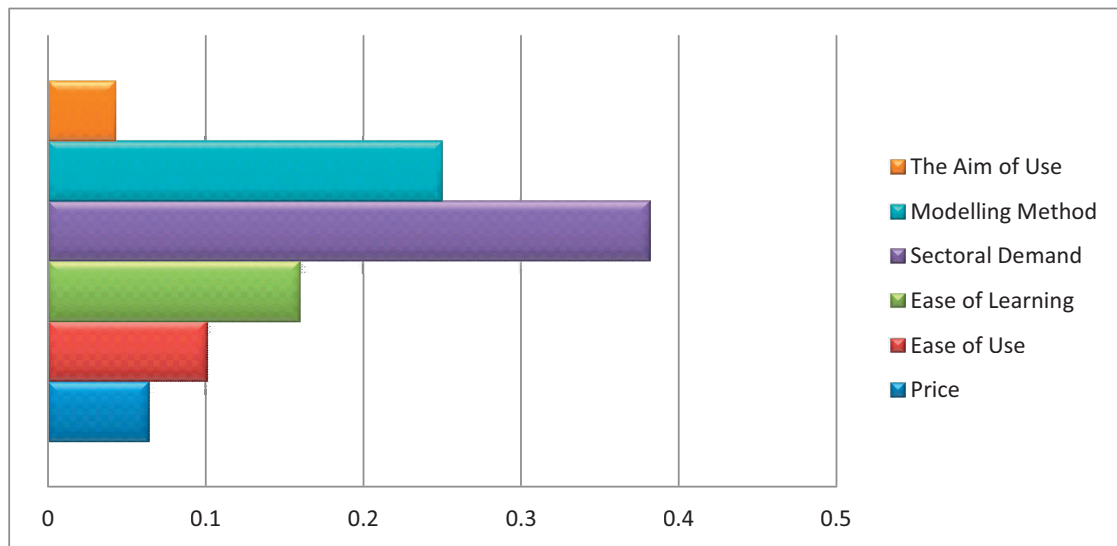
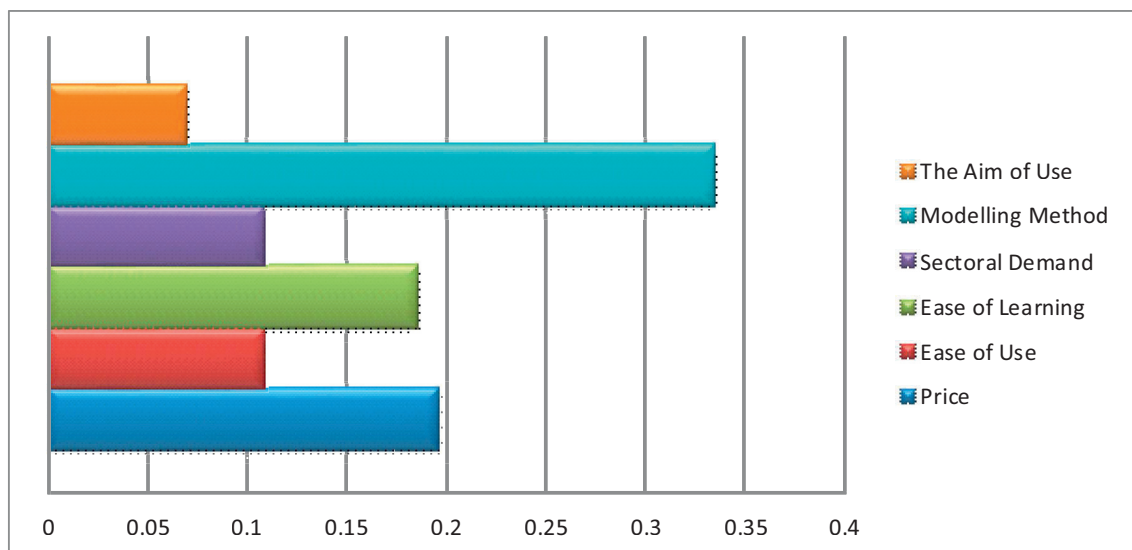


### 3. Expert Choice Study

Datas obtained from the survey was entered to Expert Choice Decision Making program. The main criterias are evaluated under the two top criteria: Students and Instructors. Regardless of the value of survey datas, instructors' criterias were taken as twice of students' criterias (Table 2).

**Table 2.** Main Decision Tree



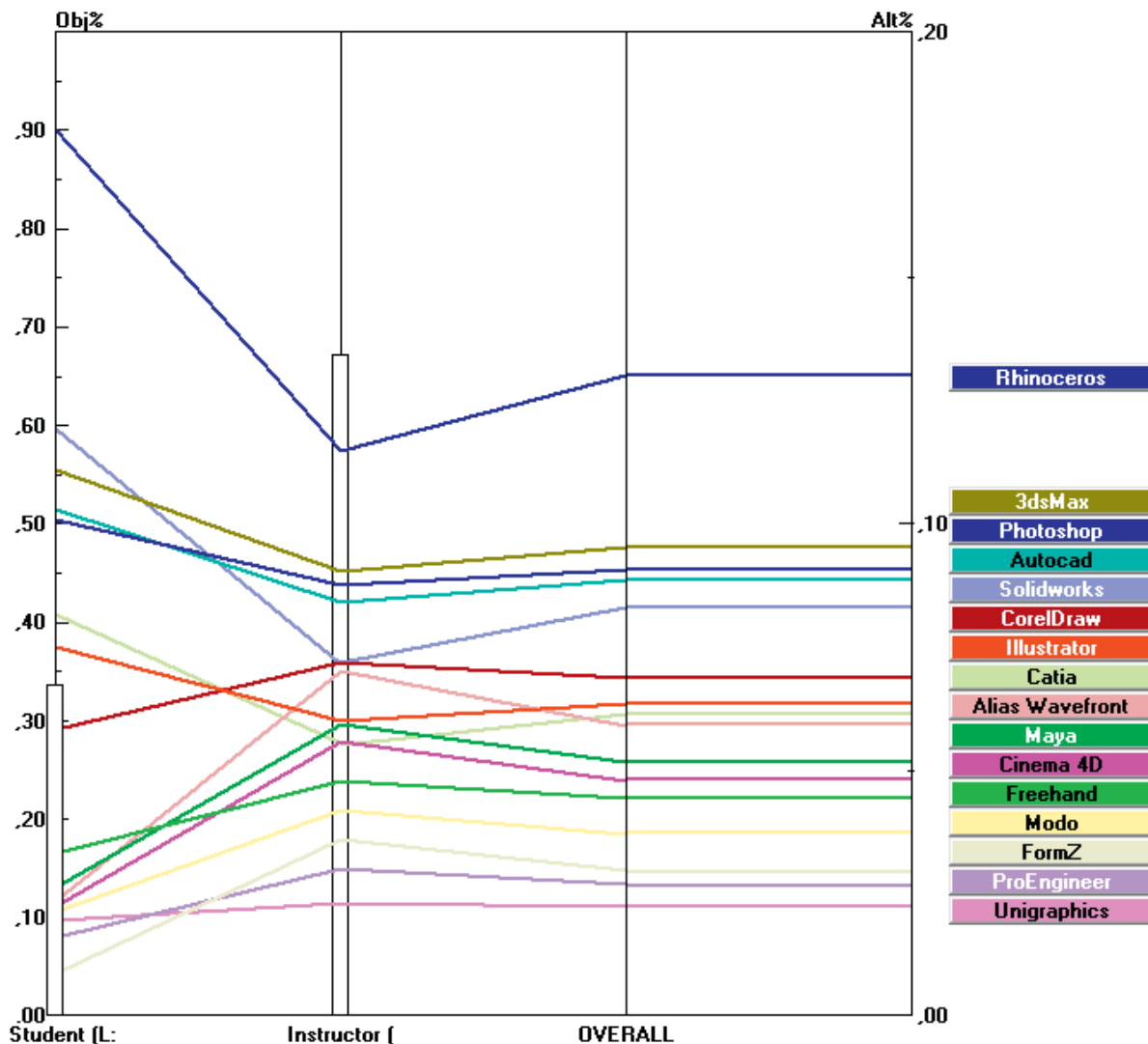
**Table 3.** Sub-criteria ranking for the student main criteria**Table 4.** Sub-criteria ranking for the instructor main criteria

Software alternatives were placed under the sub criterias price, ease of use, ease of learning, sectoral demand, modelling method and the aim of use. Sub criterias were analysed under the main criterias student and educators.

In the sub-criteria rankings, 'sectoral demand' was chosen as the most important criteria among students (Table 3) and 'modelling method' was chosen as the most important criteria among instructors (Table 4).

All datas obtained from survey studies were processed to the decision tree and software performance graph was created. Results of the performance graph can be seen at Table 5:

**Table 5.** Software performance graph



#### 4. Conclusion

As a result of the surveys and Expert Choice criteria assessment, softwares Rhinoceros, 3ds Max, Photoshop, AutoCAD, Solidworks, CorelDraw was chosen as the first six software among all criterias. Three of these programs are surface modeling (Rhinoceros, 3ds Max, AutoCAD), one solid modeling (SolidWorks), and one

2D/vectoral drawing (CorelDraw) software. The most dominant criterias for determining software was choosen as “Modelling Method” and “Sectoral Demand”.

Under the ‘ease of use” criteria, both students and instructors chose *interface* as the most important property. Students and instructors also agreed in modeling types and ranked as; surface modeling, solid modeling and 2D/vectoral drawing.

Although the first six softwares selected as the result of research was surface modelling software, results should be viewed in terms of three modeling methods. Surface modeling, solid modeling, and vector modeling methods are all needed tools for design students and taking these educations at undergraduate education support student’s performance both in undergraduate and professional design life.

During the study, observed that the number and content of CAID courses given at universities differs from each other and mostly part-time instructors are giving courses. This can be considered as the indication of not giving importance on CAID education at Turkey.

This study was performed to examine the importance and software choice of CAID courses at Industrial Product Design Departments at Turkey. Advanced study can be made with more participants at two countries to examine the regional differences at software choice.

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